



33rd Annual Arctic Workshop

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Polar Environmental Centre, Tromsø, Norway

NO-9296 Tromsø, Norway

Tel. +47-77-75-05-00, Fax: +47-77-75-05-01, e-mail: postmottak@npolar.no

<http://www.npolar.no>

Joseph R. Cannon

ONRIFO Adjunct Scientist

PSC 819 Box 31, FPO, AE 09645-0031

Tel. +34- 956-82-3993, Fax. +34-956-82-3984,

Email: cannonj@nemoc.navy.mil

CDR Christopher L. Butler, USN

Office of Naval Research International Field Office - Europe

Ocean, Atmosphere and Space S&T Focus Area

223 Old Marylebone Road, London NW1 5TH

Tel. +44- 207-514-4948, Fax. +44-207-514-4980, Email: metoc@onrifo.navy.mil

<http://www.onrifo.navy.mil>

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HL – Conference Report News Headlines: Technology advances enables higher resolution and shorter time period core analysis. Shorter Time samples reveal evidence of rapid climate changes. Warming Polar Regions inducing severe erosion, and transport of radioactive or heavy metal pollutants.

EXECUTIVE SUMMARY OF SCIENTIFIC / TECHNICAL RESULTS

Arctic researchers and top graduate students discuss latest efforts in paleoenvironmental studies including: methods of unlocking earth historical records from the ice, determining rates of historic climate change, and the effects of current global warming on arctic coastal erosion and transport/release of industrial wastes. The sessions of this annual conference were divided into 4 topics: “Marine records”(16 papers),” Terrestrial records“(8 papers), “Glaciers and Glacial history”(11 papers), and “Ice cores”(3 papers). 99 papers including 38 plenary and 61 poster papers were presented at the Conference. 86 participants from 14 countries were in attendance. The majority of the attendees were researchers, faculty and graduate students. Major sponsors were the U. S. National Science Foundation and the Research Council of Norway. A list of participants can be found at http://www.onrifo.navy.mil/reports/33_Arctic_list_of_participants1.xls.

This conference summary report focuses on the following:

1. Increasing technology is enabling analysis of core samples at higher resolutions and shorter time periods.
2. The shorter time samples are showing additional variabilities in a climate period or suggesting possibilities of rapid climate changes.
3. The general warming of Polar Regions are introducing glacial silt laden waters and loosening of former permafrost coasts resulting in severe erosion.
4. The melting of sea ice can result in long-range transport and concentrations of radioactive or heavy metal pollutants.

SCIENTIFIC PROGRAM

The final agenda, list of lectures, titles, authors, poster sessions are available from the Norwegian Polar Institute <http://www.npolar.no> ISBN 82-7666-199-8.

TRENDS AND HIGHLIGHTS

Tromsø has become a Center of Expertise with the Polar Environmental Center (<http://www.npolar.no>), the University of Tromsø (<http://www.adm.uit.no/studie/foreign/>), the Meteorology Institute (<http://met.no/index.shtml>), Norut Group LTD (<http://www.norut.no/>) - a research institute, and the University Center (<http://www.unis.no/>) actually on Svalbard. The Arctic Workshop is held every other year at the Institute of Arctic and Alpine Research (INSTAAR; <http://instaar.colorado.edu>) with alternate years at various other locations. This is the second time it has been held at Tromsø. The major Workshop themes are generally defined by the major research being conducted in the local area. This year, many of the papers and posters were on paleoenvironmental studies. By conducting isotopic decay analysis of the core samples containing benthic foraminifera, the researchers can make conclusions about past climatic events. Some of the more interesting presentations include:

1. Increased coastal erosion on the Alaskan North Slope due to increases in global temperatures

Reduction in the ice season, combined with a shrinking and thinning of the Arctic sea-ice cover is contributing to Alaskan and Siberian coastline retreats of up to meters per year. The problems include

- a. Rising temperatures
- b. Retreating sea ice.
- c. Thawing of permafrost resulting in loosening of soils
- d. More frequent intense storms due to storm track changes.
- e. Rising sea levels

With a net sea level rise and a delay in sea ice formation in the autumn, Arctic storm events can generate damaging sea level surge and swell.



Alaskan North Slope coast

Numerical modeling is being used to quantify past processes and provide future simulations including mitigation strategies such as a well-placed sunken barge to reduce flow velocities. See <http://nome.colorado.edu/HARC/index.html> for more information.

2. The release of toxic elements due to seasonal and climatic changes

Each year, large amounts of suspended and dissolved material including toxic elements enter the Barents and Kara seas. Seasonal and climatic changes provoke erosion of ore bodies causing increasing amounts of heavy metals in the vicinity of the Novaya Zemlya Shelf. Studies in 1991 – 2002 revealed high abnormal concentrations of toxic elements in the water, suspended matter and bottom sediment.



Novaya Zemlya

See http://www.vniio.nw.ru/ecosed/english/new_land/tema442.htm for more information. A publication (ISBN 5-88994-059-7) from the All-Russia Research Institute for Geology and Mineral Resources of the World Ocean (VNIIOkeangeologia) was provided. It is mostly in Russian but some additional sections and most charts and graphs are in English.

3. Role of sea ice in long-range transport of radioactive pollutants

There are known pathways for multi-year sea ice from the Siberian shelf areas to the Fram Strait and further south until the ice melts. Climate plays an important role in transport rates. Pollutants can concentrate in areas far away from sources. Researchers from the Norwegian Radiation Protection Authority and the Norwegian Polar Institute are investigating a method to measure gamma radiation from radionuclides at the Fram Strait and a Svalbard fjord. Large sample volumes are required to find measurable radiation levels making analysis difficult and time-consuming. Radiation levels in ice-rifted sediments are on average higher than those on the seafloor.

4. Abrupt climate changes from Greenland Ice Cores

Most climate-change research has focused on gradual changes, such as the processes by which emissions of greenhouse gases lead to warming of the planet. But new evidence shows that periods of gradual change in Earth's past were punctuated by episodes of abrupt change, including temperature changes of about 10 degrees Celsius, or 18 degrees Fahrenheit, in only a decade in some places. Severe floods and droughts also marked periods of abrupt change.

The planet's past climate record also needs to be better understood. Scientists have a variety of means to study what the climate was like thousands of years ago. For example, researchers look at tree rings to examine the frequency of droughts and analyze gas bubbles trapped in ice cores to measure past atmospheric conditions. With such techniques, scientists have discovered repeated instances of especially large and abrupt climate changes over the last 100,000 years during the slide into and climb out of the most recent ice age. For instance, the warming at the end of the last ice age triggered an abrupt cooling period, which finished with an especially abrupt warming about 12,000 years ago. Since then, less dramatic -- though still rapid -- climate changes have occurred, affecting precipitation, hurricanes, and the El Niño events that occasionally disrupt temperatures in the tropical Pacific. Examples of abrupt change in the past century include a rapid warming of the North Atlantic from 1920 to 1930 and the Dust Bowl drought of the 1930s.

The North Greenland Ice Core Project (NGRIP http://www.glaciology.gfy.ku.dk/ngrip/index_eng.htm) is a multinational research program, funded by participating institutions in Germany, Japan, Sweden, Switzerland, France, Belgium, Iceland and the US. Primary sponsor is the Danish Research Council. The goal is to retrieve and analyze a 3080 m long ice core drilled through the Greenland ice sheet at a place selected to give the longest reliable record.

At the Workshop, researchers from INSTAAR, Niels Bohr Institute in Denmark, and LMCE in France reported determining clues to climate change by measuring core sample isotopes from NGRIP and 3 other Greenland cores. The four cores appear coherent and suggest a 1 – 5 year rapid drop in productivity linked to re-establishment of the North Atlantic deep water and polar front retreat followed by strengthening of the Iceland Low pressure drawing storms in Greenland.

ADDITIONAL TOPICS

Private discussions with a key member of the U.S. National Science Foundation – Office of Polar Programs (<http://www.nsf.gov/od/opp/arctic/natural.htm>) revealed a planned Swedish/American transit by the Swedish icebreaker “Oden” (

eng/htm/a141/odeneng.htm) and USCGC “Healy” (<http://www.uscg.mil/pacarea/healy/>) in 2005. Proposals are being considered.

PROCEEDINGS

The 33rd Annual Arctic Workshop Abstracts were published (ISBN 82-7666-199-8 edition in English), and provided at the workshop. Also provided was a copy of Polar Research Vol 20 No 1 from the Norwegian Polar Institute and brochures from the Polar Environmental Center.

ASSESSMENT

The 33rd Annual Arctic Workshop has grown out of a series of informal annual meetings sponsored by INSTAAR and other academic institutions worldwide. It is an opportunity for graduate students to present ongoing research, practice public speaking, and get feedback from senior researchers. As the conference is held in different locations, the themes vary from year to year, with this year’s theme on paleoenvironmental studies. It is recommended that ONR attend future workshops every 2 – 3 years.

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